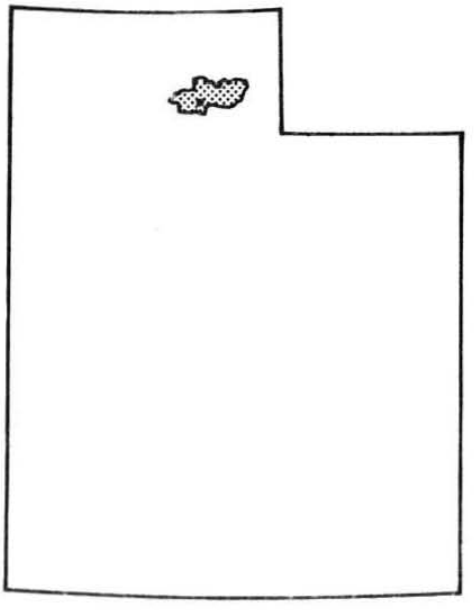
1982

Flood Insurance Study, City of Ogden, Utah, Weber County

Federal Emergency Management Agency

FLOOD INSURANCE STUDY

CITY OF OGDEN, UTAH
WEBER COUNTY



JULY 19, 1982

Federal Emergency Management Agency

COMMUNITY NUMBER - 490189

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PUBLISHED SEPARATELY:

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Ogden, Weber County, Utah, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Ogden to the regular program of flood insurance by the Federal Emergency Management Agency. Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 24 CFR, 1910.1(d). In such cases, however, it shall be understood that the State (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by Gingery Associates, Inc., for the Federal Emergency Management Agency, under Contract No. H-4790. This work, which was completed in July 1980, covered all significant flooding sources affecting Ogden.

1.3 Coordination

Streams requiring detailed and approximate study were identified at a meeting attended by representatives of the study contractor, the Federal Emergency Management Agency, and the City of Ogden on April 24, 1978.

During the course of the study, hydrologic and other flood information was coordinated with the Federal Emergency Management Agency and the other agencies involved.

The final coordination meeting was held on August 13, 1981, and was attended by representatives of the Federal Emergency Management Agency, the study contractor, and the city. No problems were raised at the meeting.

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the main sources of income. Most of the industrial development is in the western portion of the city. Development in the remaining areas is residential. Further growth is expected with the addition of a new, large mall.

The Ogden area has a temperate, semiarid climate with four well-defined seasons; summers are warm and dry, and winters are cold, but usually not severe. The average temperature in Ogden is 51.4°F, and annual precipitation totals 20 inches (Reference 2).

The changes in topography in the area are often dramatic, with the high mountain peaks dropping to the low terraces and lake plains.

The native vegetation consists mainly of grasses (salt grass and wire grass) at the low terraces and changes to small bushes and shrubs (sagebrush and brushy oak) at the higher terraces, up to an elevation of approximately 7500 feet. Above that elevation, alpine forest of aspen, fir, pine, and spruce is dominant (References 3 and 4).

Flows in the area generally begin in the mountain basins and flow westerly in steep canyons cut through the front range of peaks toward the urbanizing lake plain.

Ogden River flows westerly through Ogden at an average slope of 36 feet per mile. It has a total drainage area of approximately 360 square miles.

Weber River flows northerly through Ogden at an average slope of 17 feet per mile. It has a width of approximately 100 feet and a depth of approximately 12 feet, and it drains an area of approximately 2000 square miles at Ogden.

Beus Creek flows westerly through Ogden at an average slope of 200 feet per mile. It drains an area of 1.1 square miles at its canyon mouth, and it has a total drainage area of 1.6 square miles at the downstream study limit.

Burch Creek flows westerly through Ogden at an average slope of 157 feet per mile. At its canyon mouth, Burch Creek drains an area of 2.5 square miles, and it has a total drainage area of 5.0 square miles at the downstream study limit.

Jumpoff Gulch flows westerly through Ogden at an average slope of 325 feet per mile. At its canyon mouth, it drains an area of 1.6 square miles, and it has a total drainage area of 2.3 square miles at the downstream study limit.

Development in the flood plains of the detailed study streams varies. Weber River flows through manufacturing areas and railroad

yards. The Ogden River flood plain is generally confined to the channel. Portions of the Burch Creek, Beus Creek, and Jumpoff Gulch flood plains are undeveloped. However, the area is zoned residential, and development is expected to increase.

The primary soils in the Ogden area are of the Sunset-Kirkham-Martini Association. They are somewhat poorly drained and moderately well-drained (Reference 5).

2.3 Principal Flood Problems

For Weber and Ogden Rivers, snowmelt floods are the most serious flood hazard. These floods are characterized by large-volume runoff, moderately high peak flows, and marked diurnal fluctuation in flow (References 3 and 4).

For Burch Creek, Beus Creek, and Jumpoff Gulch, the most serious flooding in the study area would result from high-intensity, convective-type cloudburst storms centered over the tributary areas. Such storms, which last from a few minutes to several hours, can occur from mid-April through September. These storms are characterized by high peaks, high velocity, short duration, and small volume of runoff (Reference 6).

Flooding on Burch Creek is known to have occurred in 1952, 1964, and 1967. On Weber River, flooding occurred in 1896, 1907, 1909, 1920, 1922, and 1952. Flooding on Ogden River occurred in 1901, 1907, 1926, 1936, and 1952. However, little definitive data other than recorded or estimated flow values are available for any of these floods. This flooding has caused extensive damage by floodwaters flowing into basements and by deposition of sand, silt, and debris on gardens and lawns. Agricultural lands, roads, and highways have also been damaged, particularly in the area downstream from the canyon mouth. Flooding in the area has been controlled to some degree by the reservoirs in the area and some channel improvement projects, but flooding still remains a serious hazard (References 3, 4, and 6).

2.4 Flood Protection Measures

Reservoirs of the Weber Basin Project (completed in the mid-1960s by the U.S. Bureau of Reclamation) provide a combined flood-control reservation of approximately 320,000 acre-feet and afford a moderate degree of flood protection to the study area from Weber River flow (Reference 3).

Pineview and Causey Reservoirs are located on Ogden River and South Fork Ogden River, respectively, and form a part of the Weber Basin Project. These are U.S. Bureau of Reclamation projects, and they provide a significant degree of protection from floods originating above Ogden Canyon (Reference 4). Some channel improvement projects have also been completed for Ogden and Weber Rivers.

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In the final evaluation, the discharge-frequency distribution curve for a stream due to snowmelt was determined from analysis of the gaging station records or the related regression equations. The discharge-frequency distribution curve for the rainfall-caused events was evaluated from the results of the SWMM simulation or the related regression equations. These two independent events were statistically combined to yield a discharge-frequency distribution for the combined event.

Peak discharge-drainage area relationships for Weber River, Ogden River, Burch Creek, Beus Creek, and Jumpoff Gulch are shown in Table 1.

Discharges for Ogden River reflect the storage effect of Pineview Reservoir.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flooding sources.

Cross section data for Weber River, Ogden River, and Burch Creek were obtained from previous studies done by the U.S. Army Corps of Engineers (References 3, 4, and 6) and were supplemented by field-surveyed cross sections.

Beus Creek and Jumpoff Gulch cross sections were taken from topographic maps at scales of 1:1200 and 1:2400, both with a contour interval of 2 feet (References 17 and 18, respectively).

All bridges, dams, and culverts were measured to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Roughness coefficients (Manning's "n") were estimated by field inspection. The following list shows the range of roughness values for the channels and for the overbank areas:

	Roughness Coefficients	
Flooding Source	Channel Area	Overbank Area
Weber River	0.030	0.060-0.080
Ogden River	0.040-0.045	0.035-0.080
Burch Creek	0.050	0.060-0.070
Beus Creek	0.055-0.060	0.055-0.070
Jumpoff Gulch	0.050	0.050

Table 1. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second) 10-Year	50-Year	100-Year	500-Year
Weber River					
Upstream of Confluence With Ogden River	1,610.0	3,600	5,300	7,000	12,000
Ogden River					
Upstream of Confluence With Weber River	360.0	1,500	1,600	1,600	3,000
At Canyon Mouth	320.0	1,500	1,600	1,600	1,600
Burch Creek					
At Harrison Boulevard	3.4	100	205	270	450
At Canyon Mouth	2.5	40	60	95	260
Beus Creek					
At Harrison Boulevard	1.6	25	75	120	330
At Canyon Mouth	1.1	15	30	40	80
Jumpoff Gulch					
At State Highway 235	2.3	140	280	360	585
At Canyon Mouth	1.6	30	50	75	220

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The floodways presented in this study were computed on the basis of equal-conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

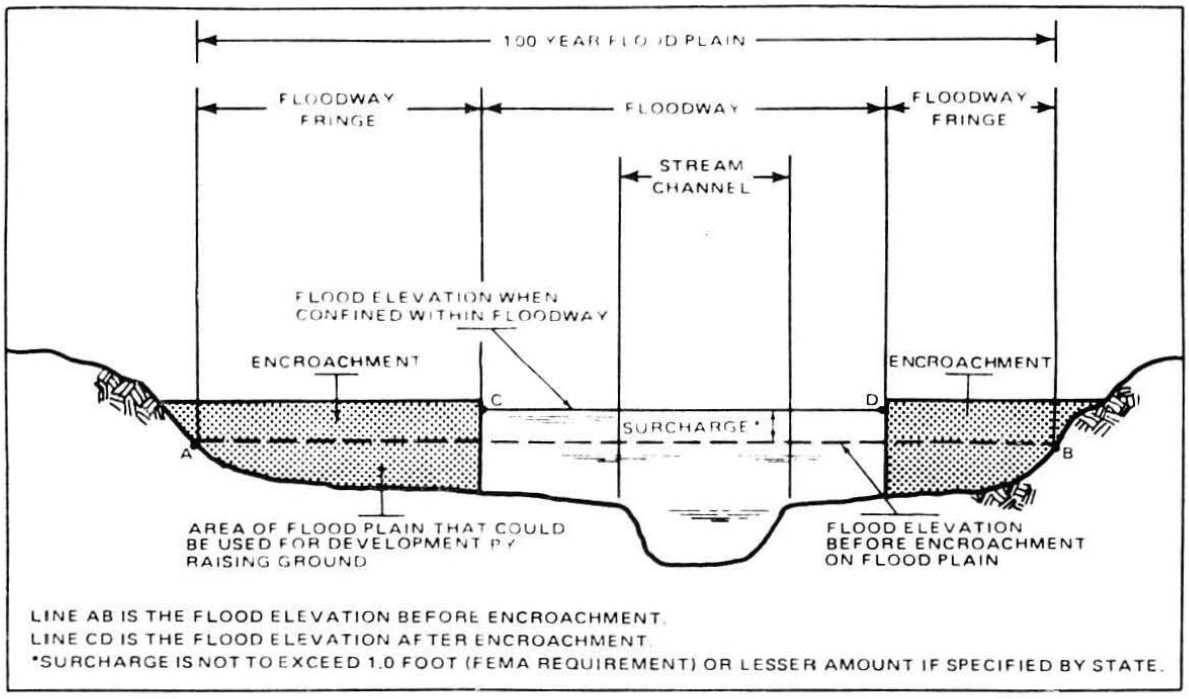

Figure 2. Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Weber River								
A	66,175	288	1,368	5.1	4,280.2	4,280.2	4,280.2	0.0
B	67,300	153	837	8.4	4,281.5	4,281.5	4,282.2	0.7
C	67,750	299	1,337	5.2	4,283.7	4,283.7	4,284.2	0.5
D	68,350	120	887	7.9	4,284.6	4,284.6	4,285.0	0.4
E	68,700	181	1,272	5.5	4,285.6	4,285.6	4,286.0	0.4
F	69,150	125	750	9.3	4,286.2	4,286.2	4,286.7	0.5
G	69,650	85	501	14.0	4,289.0	4,289.0	4,289.0	0.0
H	69,700	92	717	9.8	4,291.4	4,291.4	4,291.4	0.0
I	70,150	200	1,461	4.8	4,293.4	4,293.4	4,293.4	0.0
J	70,200	110	932	7.5	4,293.4	4,293.4	4,293.4	0.0
K	70,250	110	1,033	6.8	4,294.3	4,294.3	4,294.3	0.0
L	70,300	150	1,756	4.0	4,294.7	4,294.7	4,294.8	0.1
M	70,350	150	1,763	4.0	4,294.7	4,294.7	4,294.8	0.1
N	70,450	292	2,197	3.2	4,294.9	4,294.9	4,294.9	0.0
O	70,800	248	1,167	6.0	4,294.9	4,294.9	4,294.9	0.0
P	71,150	260	1,080	6.5	4,294.9	4,294.9	4,295.3	0.4
Q	71,350	210	915	7.7	4,295.9	4,295.9	4,296.1	0.2
R	71,750	702	2,175	3.2	4,297.7	4,297.7	4,298.0	0.3
S	71,950	947	3,685	1.9	4,298.2	4,298.2	4,298.4	0.2
T	72,650	764	2,243	3.1	4,298.8	4,298.8	4,298.9	0.1
U	73,100	913	2,812	2.5	4,300.1	4,300.1	4,300.3	0.2
V	73,800	909	1,997	3.5	4,301.1	4,301.1	4,301.5	0.4
W	74,350	1,053	2,769	2.5	4,302.6	4,302.6	4,303.2	0.6
X	75,350	633	1 284	5.5	4,305.2	4,305.2	4,305.7	0.5
Y	75,800	201	901	7.8	4,307.9	4,307.9	4,308.5	0.6
Z	76,075	270	1,074	6.5	4,308.2	4,308.2	4,308.7	0.5

[1] Feet Above Southern Pacific Railroad Bridge (Bridge Located in Section 19 T.6N., R.2W.)

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

FLOODWAY DATA

WEBER RIVER

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Ogden River								
A	2,140	91	550	2.9	4,268.8	4,268.8	4,269.2	0.4
B	4,750	126	449	3.6	4,271.4	4,271.4	4,271.4	0.0
C	6,200	90	201	8.0	4,276.5	4,276.5	4,276.5	0.0
D	6,300	67	204	7.9	4,277.8	4,277.8	4,277.8	0.0
E	6,430	72	263	6.1	4,279.1	4,279.1	4,279.1	0.0
F	6,550	65	172	9.3	4,280.2	4,280.2	4,280.2	0.0
G	7,150	158	538	3.0	4,283.5	4,283.5	4,283.5	0.0
H	7,960	107	522	3.1	4,284.2	4,284.2	4,284.3	0.1
I	8,080	150	522	3.1	4,284.3	4,284.3	4,284.3	0.0
J	8,180	139	555	2.4	4,284.4	4,284.4	4,284.4	0.0
K	9,190	119	330	4.9	4,286.2	4,286.2	4,286.2	0.0
L	9,250	91	332	4.8	4,286.4	4,286.4	4,286.4	0.0
M	9,350	93	361	4.4	4,286.7	4,286.7	4,286.7	0.0
N	9,400	60	209	7.6	4,286.7	4,286.7	4,286.7	0.0
O	10,000	70	313	5.1	4,289.8	4,289.8	4,289.8	0.0
P	10,110	86	523	3.1	4,290.3	4,290.3	4,290.3	0.0
Q	10,200	86	531	3.0	4,290.4	4,290.4	4,290.4	0.0
R	10,250	52	266	6.0	4,290.4	4,290.4	4,290.4	0.0
S	11,050	48	212	7.6	4,293.3	4,293.3	4,293.3	0.0
T	11,150	64	404	4.0	4,294.4	4,294.4	4,294.4	0.0
U	11,220	64	410	3.9	4,294.5	4,294.5	4,294.5	0.0
V	11,320	72	294	5.4	4,294.5	4,294.5	4,294.5	0.0
W	11,900	77	378	4.2	4,296.2	4,296.2	4,296.2	0.0
X	12,000	123	747	2.1	4,296.6	4,296.6	4,296.6	0.0
Y	12,110	123	746	2.1	4,296.6	4,296.6	4,296.6	0.0
Z	12,180	98	373	4.3	4,296.6	4,296.6	4,296.6	0.0

[1] Feet Above Confluence With Weber River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

FLOODWAY DATA

OGDEN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Ogden River (Cont'd)								
AA	13,110	71	263	6.1	4,299.3	4,299.3	4,299.3	0.0
AB	13,920	54	210	7.6	4,303.8	4,303.8	4,303.8	0.0
AC	14,380	56	235	6.8	4,307.0	4,307.0	4,307.0	0.0
AD	14,450	74	323	5.0	4,307.8	4,307.8	4,307.8	0.0
AE	14,480	65	283	5.7	4,308.0	4,308.0	4,308.0	0.0
AF	14,520	72	350	4.6	4,309.7	4,309.7	4,309.7	0.0
AG	14,720	68	314	5.1	4,310.1	4,310.1	4,310.1	0.0
AH	14,820	68	308	5.2	4,310.4	4,310.4	4,310.4	0.0
AI	14,860	67	295	5.4	4,310.4	4,310.4	4,310.4	0.0
AJ	15,040	66	284	5.6	4,310.9	4,310.9	4,310.9	0.0
AK	15,130	52	301	5.3	4,311.3	4,311.3	4,311.3	0.0
AL	15,170	52	303	5.3	4,311.3	4,311.3	4,311.3	0.0
AM	15,210	52	292	5.5	4,311.4	4,311.4	4,311.4	0.0
AN	15,720	52	394	4.7	4,312.6	4,312.6	4,312.6	0.0
AO	15,810	110	609	2.6	4,313.0	4,313.0	4,313.0	0.0
AP	15,890	116	597	2.7	4,314.7	4,314.7	4,314.7	0.0
AQ	15,930	68	285	5.6	4,314.7	4,314.7	4,314.7	0.0
AR	16,540	90	334	4.8	4,317.4	4,317.4	4,317.4	0.0
AS	16,890	207	252	6.4	4,320.4	4,320.4	4,320.4	0.0
AT	17,560	210	540	3.0	4,325.2	4,325.2	4,325.2	0.0
AU	18,280	209	411	3.9	4,327.6	4,327.6	4,327.6	0.0
AV	19,010	209	453	3.5	4,331.3	4,331.3	4,331.3	0.0
AW	19,200	60	209	7.6	4,331.6	4,331.6	4,331.6	0.0
AX	19,360	63	284	5.6	4,331.8	4,331.8	4,332.8	1.0
AY	19,400	58	166	9.7	4,334.4	4,334.4	4,334.4	0.0
AZ	20,160	180	366	4.4	4,342.6	4,342.6	4,342.6	0.0

[1] Feet Above Confluence With Weber River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

FLOODWAY DATA

OGDEN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Ogden River (Cont'd)								
BA	20,910	178	238	6.7	4,354.7	4,354.7	4,354.7	0.0
BB	21,610	94	196	8.2	4,366.5	4,366.5	4,366.5	0.0
BC	22,130	98	354	4.5	4,369.3	4,369.3	4,370.3	1.0
BD	22,640	120	232	6.9	4,372.7	4,372.7	4,372.9	0.2
BE	23,380	81	182	8.8	4,385.3	4,385.3	4,385.3	0.0
BF	24,190	56	182	8.8	4,397.1	4,397.1	4,397.3	0.2
BG	24,760	54	166	9.6	4,405.6	4,405.6	4,405.6	0.0
BH	24,890	61	275	5.8	4,407.3	4,407.3	4,407.4	0.1
BI	24,980	61	288	5.5	4,407.5	4,407.5	4,407.6	0.1
BJ	25,000	97	196	8.2	4,408.9	4,408.9	4,408.9	0.0

[1] Feet Above Confluence With Weber River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

FLOODWAY DATA

OGDEN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Burch Creek								
A	17,990	60	449	0.6	4,762.6	4,762.6	4,762.6	0.0
B	18,250	30	39	7.0	4,770.3	4,770.3	4,770.3	0.0
C	18,580	31	38	7.1	4,783.3	4,783.3	4,783.3	0.0
D	18,960	28	40	6.7	4,807.8	4,807.8	4,807.8	0.0
E	19,620	3	14	12.4	4,841.8	4,841.8	4,841.8	0.0
F	20,400	23	35	5.2	4,873.2	4,873.2	4,873.2	0.0
G	20,990	32	30	5.9	4,902.4	4,902.4	4,902.4	0.0
H	21,090	31	32	5.6	4,905.1	4,905.1	4,905.1	0.0
I	21,310	37	33	5.5	4,932.4	4,932.4	4,932.4	0.0
J	21,980	50	37	4.8	4,971.4	4,971.4	4,971.4	0.0

[1] Feet Above Confluence With Weber River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

FLOODWAY DATA

BURCH CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Beus Creek								
A	55[1]	85	305	0.4	4,766.7	4,766.7	4,767.4	0.7
B	180[1]	15	19	6.3	4,770.1	4,770.1	4,770.6	0.5
C	305[1]	10	16	7.4	4,777.2	4,777.2	4,777.8	0.6
D	440[1]	10	16	7.4	4,785.6	4,785.6	4,786.0	0.4
E	535[1]	15	21	5.6	4,790.6	4,790.6	4,791.2	0.6
F	810[1]	15	19	6.4	4,803.2	4,803.2	4,803.7	0.5
G	950[1]	15	23	5.2	4,809.0	4,809.0	4,809.7	0.7
H	1,155[1]	10	19	6.3	4,818.1	4,818.1	4,818.3	0.2
I	1,340[1]	10	20	5.8	4,825.5	4,825.5	4,826.3	0.8
J	1,530[1]	15	19	6.3	4,835.9	4,835.9	4,836.3	0.4
K	1,660[1]	20	27	4.5	4,841.8	4,841.8	4,842.4	0.6
L	1,925[1]	10	16	7.4	4,856.7	4,856.7	4,856.7	0.0
M	2,165[1]	10	16	7.4	4,871.6	4,871.6	4,872.0	0.4
N	2,380[1]	10	16	7.2	4,886.1	4,886.1	4,886.4	0.3
Jumpoff Gulch								
A	0[2]	34	160	0.5	4,416.3	4,416.3	4,417.3	1.0
B	330[2]	10	12	6.2	4,438.1	4,438.1	4,438.5	0.4
C	732[2]	7	11	7.1	4,471.1	4,471.1	4,471.2	0.1
D	865[2]	14	14	5.5	4,499.9	4,499.9	4,499.9	0.0
E	1,315[2]	11	12	6.0	4,566.7	4,566.7	4,566.7	0.0

[1]Feet Above Upstream Edge of Old Post Road [2]Feet Above Upstream Edge of Jackson Avenue

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

FLOODWAY DATA

BEUS CREEK-JUMPOFF GULCH

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the Federal Emergency Management Agency has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each flooding source studied in detail affecting the City of Ogden.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach:

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of Ogden are shown on the Flood Profiles (Exhibit 1) and summarized in Table 3.

5.2 Flood Hazard Factors

The FHF is the Federal Emergency Management Agency device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of Ogden was divided into zones,

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET NGVD)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
Weber River							
Reach 1	0003	-1.6	N/A[4]	N/A[4]	015	A3	Varies - See Map
Reach 2	0003	-2.3	-1.0	2.7	025	A5	Varies - See Map
Reach 3	0003	-4.1	-2.1	3.4	040	A8	Varies - See Map
Reach 4	0003,0005	-1.2	-0.6	1.8	010	A2	Varies - See Map
Reach 5	0005	-2.0	-0.9	2.4	020	A4	Varies - See Map
Ogden River							
Reach 1	0003,0004	-0.4	-0.1	2.0	005	A1	Varies - See Map
Burch Creek							
Reach 1	0008	-1.0	-0.5	1.8	010	A2	Varies - See Map
Beus Creek							
Reach 1	0008	-0.6	-0.2	0.6	005	A1	Varies - See Map
Shallow Flooding	0008	N/A	N/A	N/A	N/A	AH	4851
Jumpoff Gulch							
Reach 1	0002	-0.6	-0.3	0.9	005	A1	Varies - See Map
Shallow Flooding	0002	N/A	N/A	N/A	N/A	AH	4320
Shallow Flooding	0002	N/A	N/A	N/A	N/A	A0	Depth 1

[1]Flood Insurance Rate Map Panel [2]Weighted Average [3]Rounded to Nearest Foot
[4]Difference Not Applicable, Entire Reach in Limited Detailed Study Area in Unincorporated Weber County

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

FLOOD INSURANCE ZONE DATA

WEBER RIVER-OGDEN RIVER-BURCH CREEK-BEUS CREEK-JUMPOFF GULCH

each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zone A0:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; depths are shown, but no FHFs are determined.
Zone AH:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; base flood elevations are shown, but no FHFs are determined.
Zones A1, A2, A3, A4, A5, and A8:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

The flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community are summarized in Table 3.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for Ogden is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood eleva-

tion lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the Federal Emergency Management Agency.

6.0 OTHER STUDIES

Because of the use of more recent data and more accurate study procedures, this Flood Insurance Study supersedes the previously published Flood Hazard Boundary Map for the City of Ogden (Reference 23).

This Flood Insurance Study also supersedes the U.S. Army Corps of Engineers reports for Weber River (Reference 3), Ogden River (Reference 4), and Burch Creek (Reference 6) because of the use of updated hydrologic information.

Flood Insurance Studies for the Cities of Harrisville (Reference 24), North Ogden (Reference 25), Riverdale (Reference 26), South Ogden (Reference 27), and unincorporated areas of Weber County (Reference 20) are in exact agreement with this Flood Insurance Study.

This study is authoritative for the purposes of the National Flood Insurance Program; data presented herein either supersede or are compatible with all previous determinations.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, Building 710, Denver Federal Center, Lakewood, Colorado 80225.

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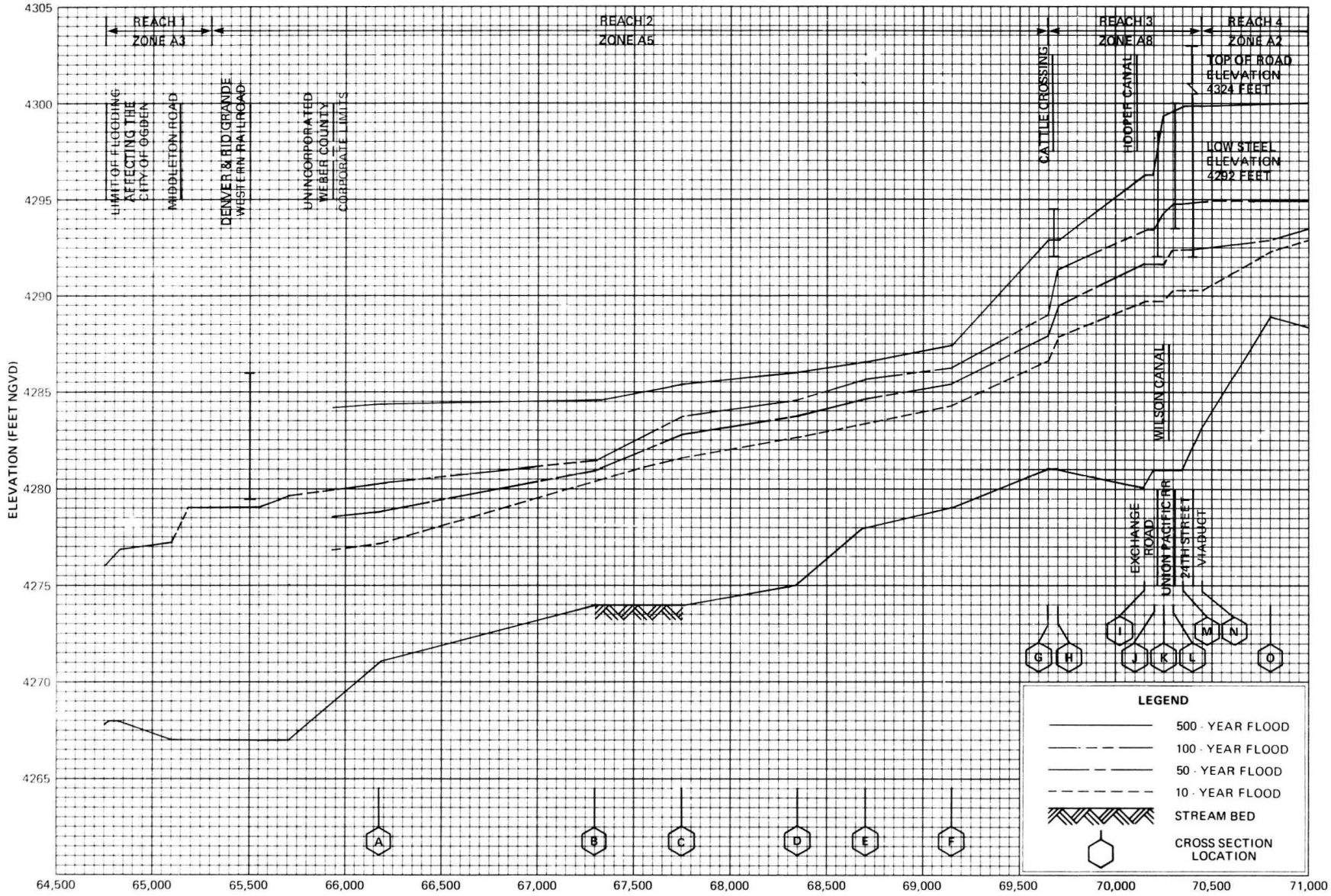

STREAM DISTANCE IN FEET ABOVE SOUTHERN PACIFIC RAILROAD BRIDGE (BRIDGE LOCATED IN SECTION 19 T. 6N., R. 2W.)

FLOOD PROFILES

WEBER RIVER

FEDERAL EMERGENCY MANAGEMENT AGEN

CITY OF OGDEN, UT
(WEBER CO.)

01P

FLOOD PROFILES

WEBER RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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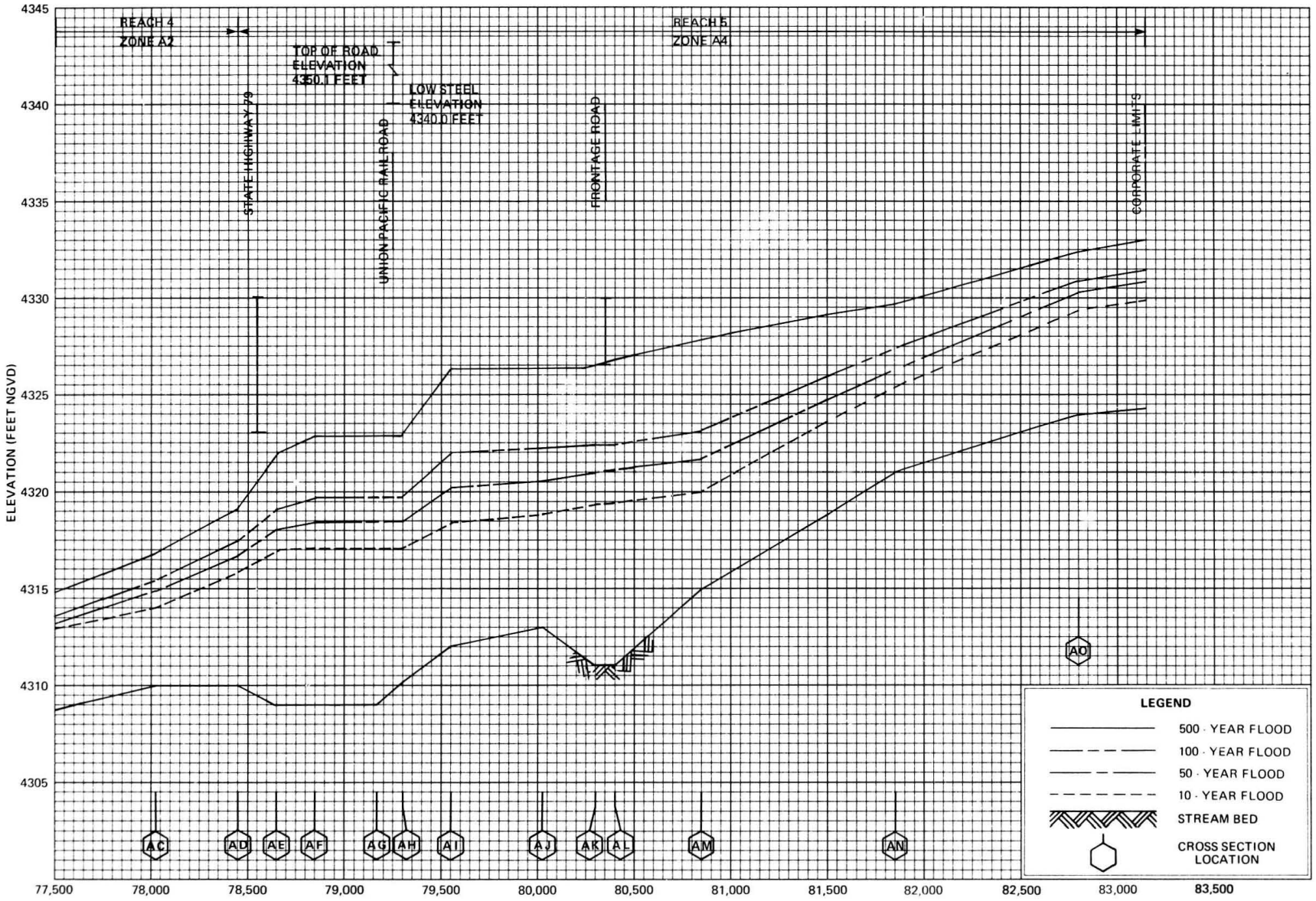

FLOOD PROFILES

WEBER RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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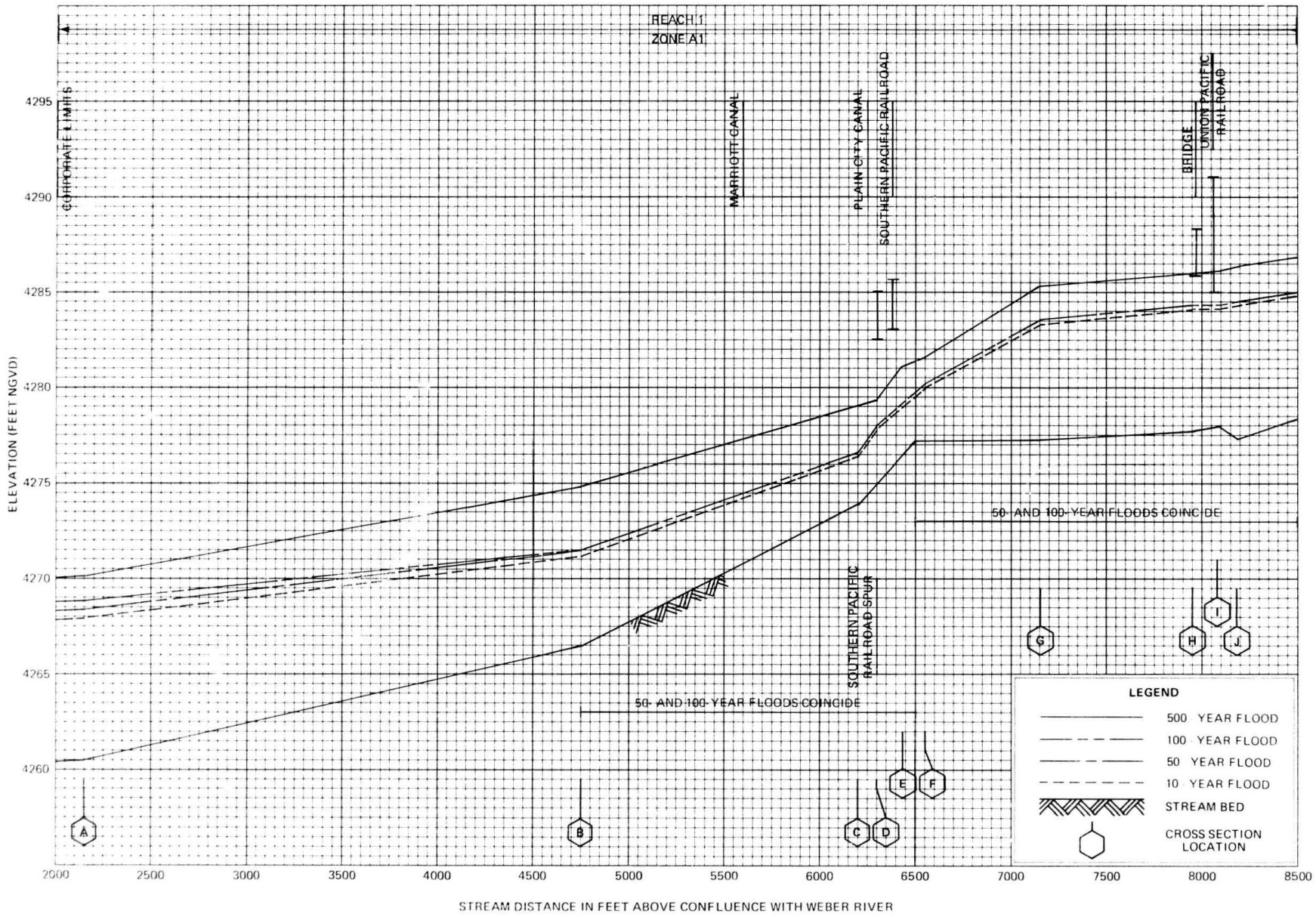

FLOOD PROFILES

OGDEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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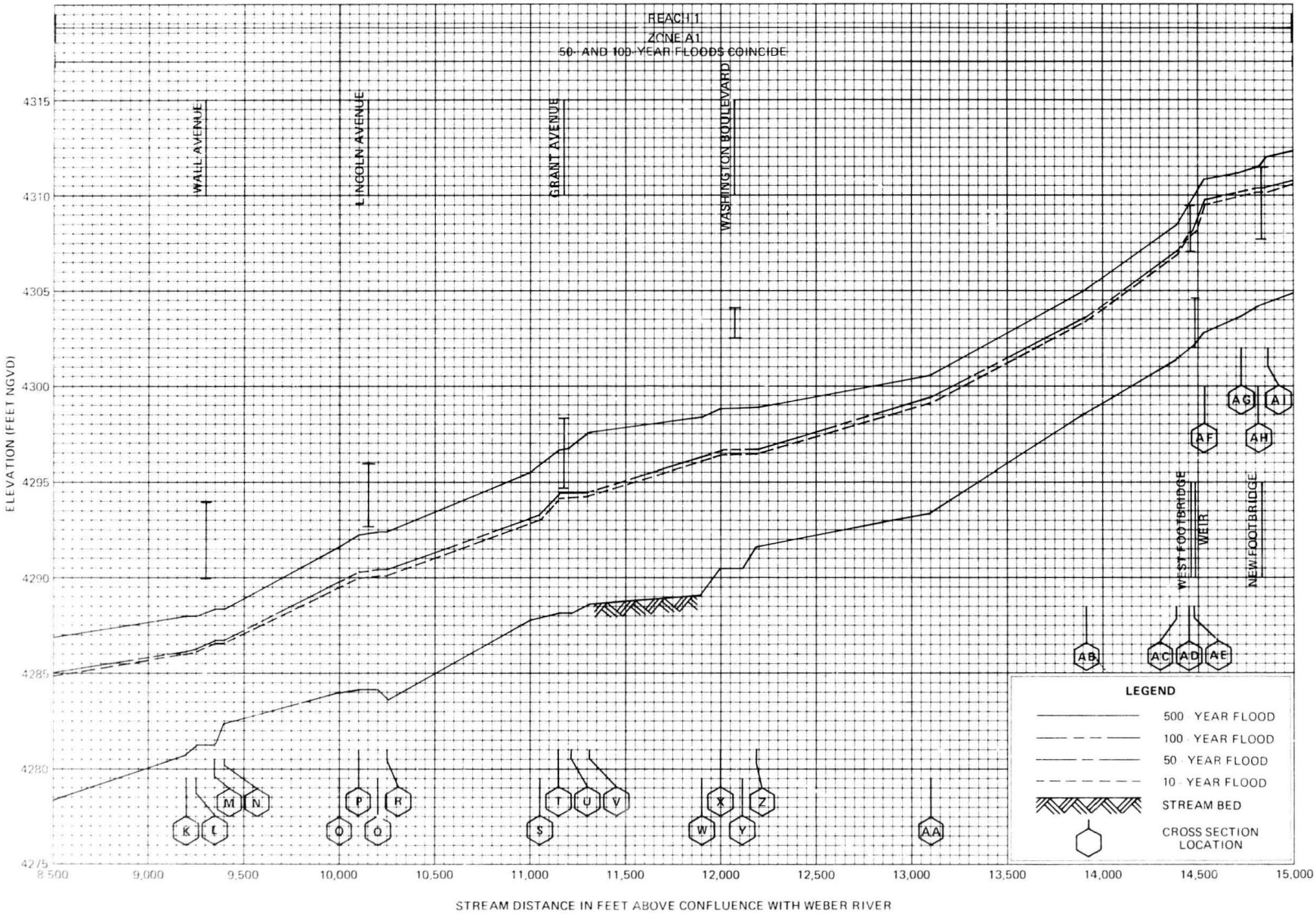

FLOOD PROFILES

OGDEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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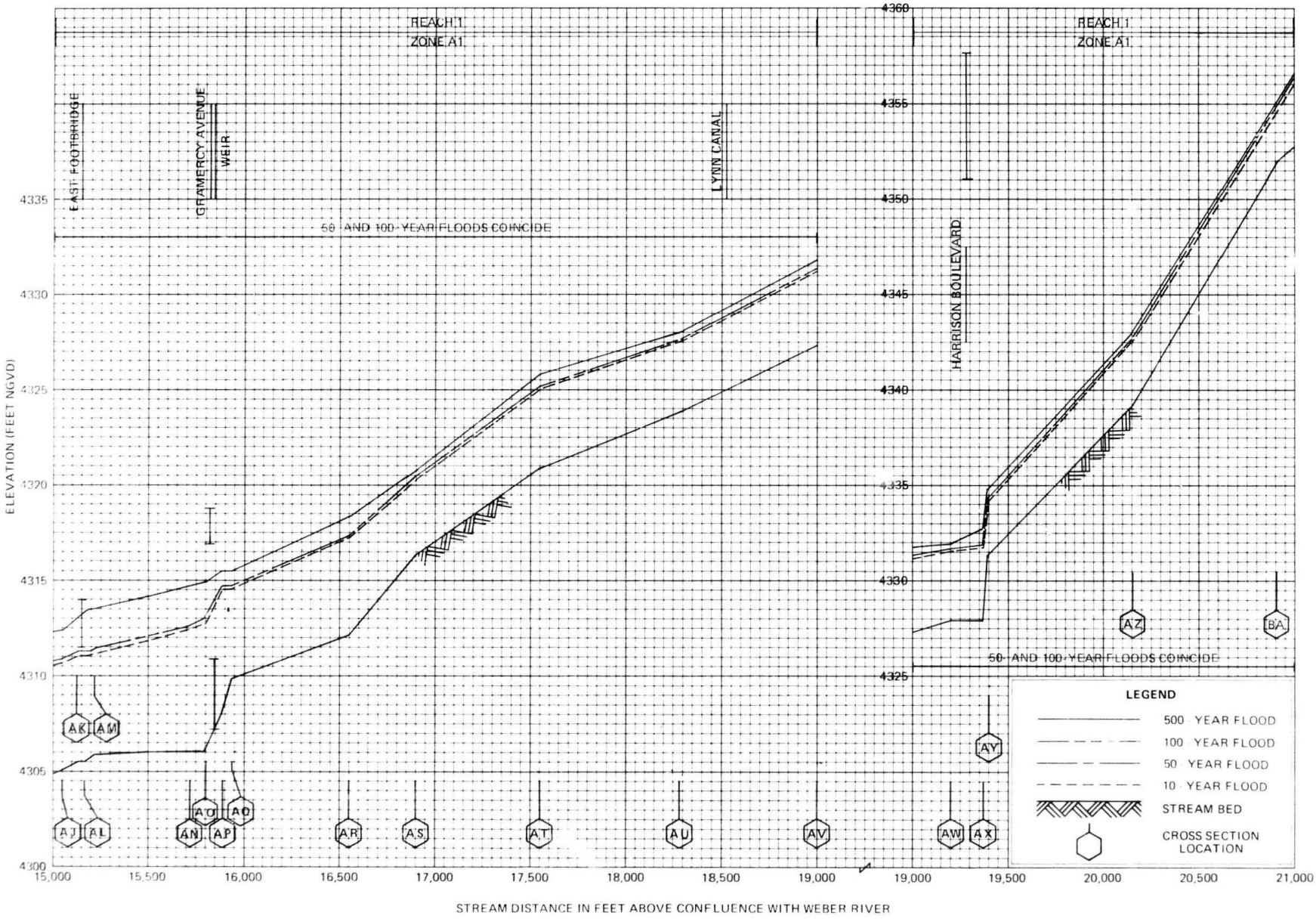

FLOOD PROFILES

OGDEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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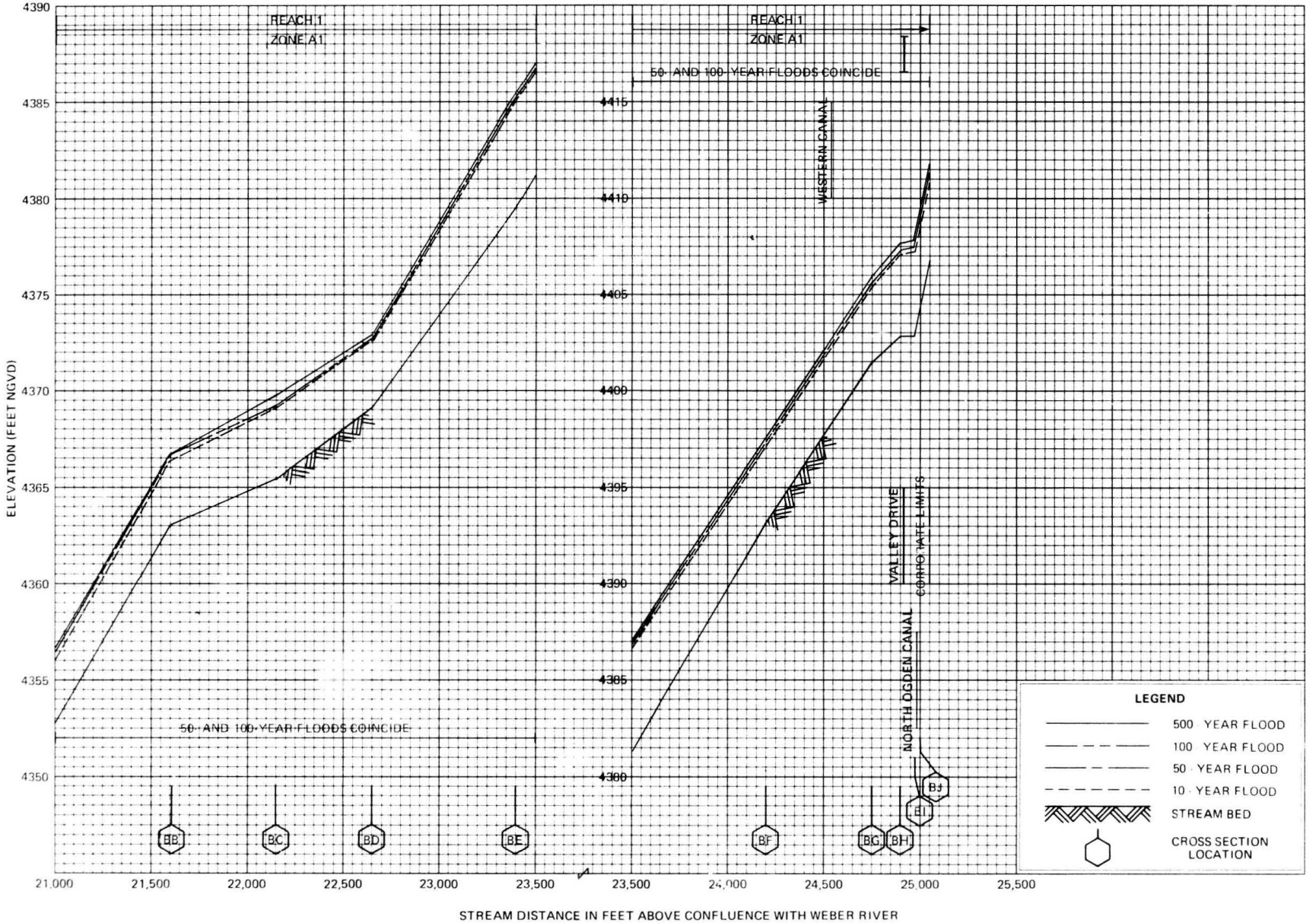

FLOOD PROFILES

OGDEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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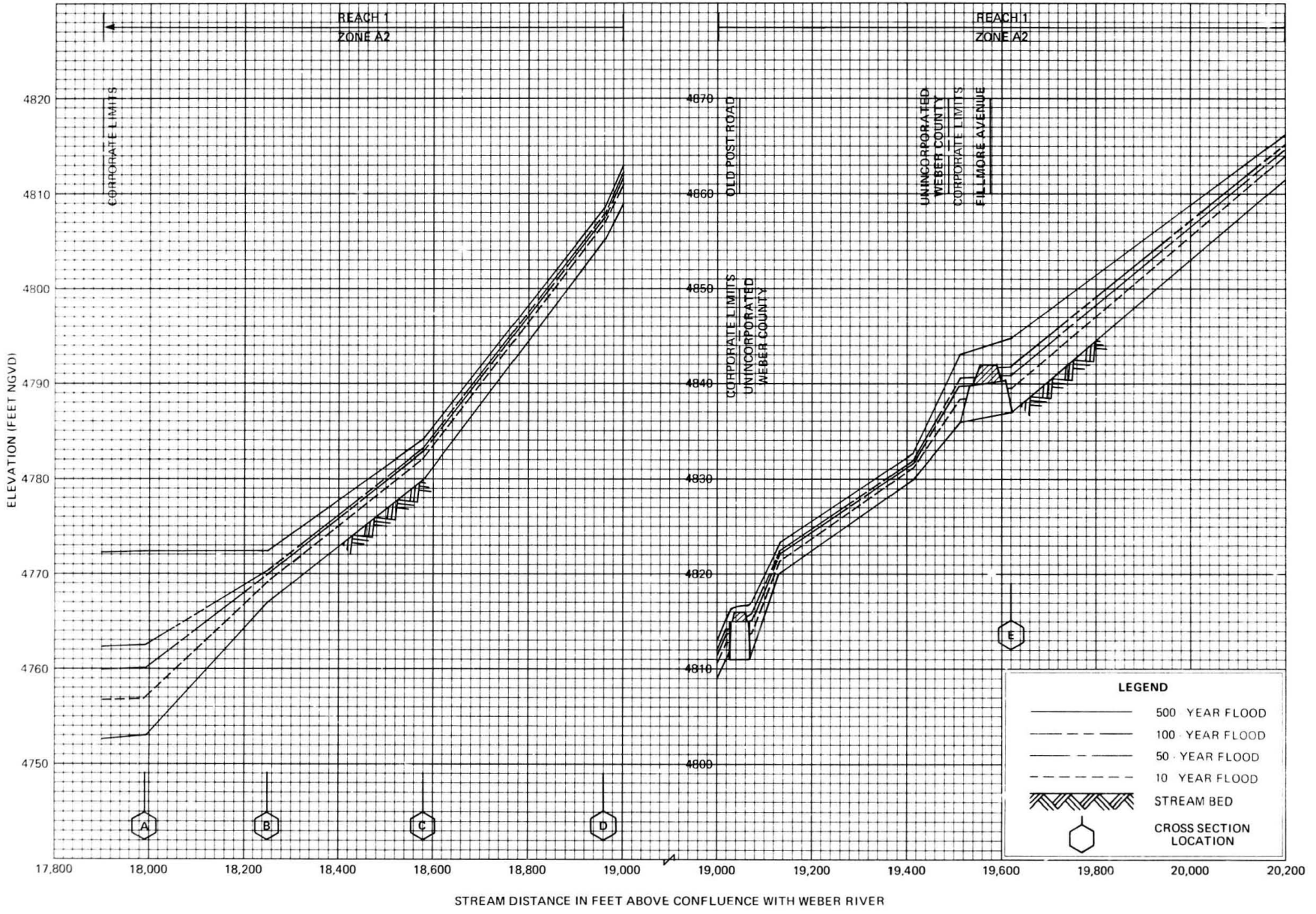

FLOOD PROFILES

BURCH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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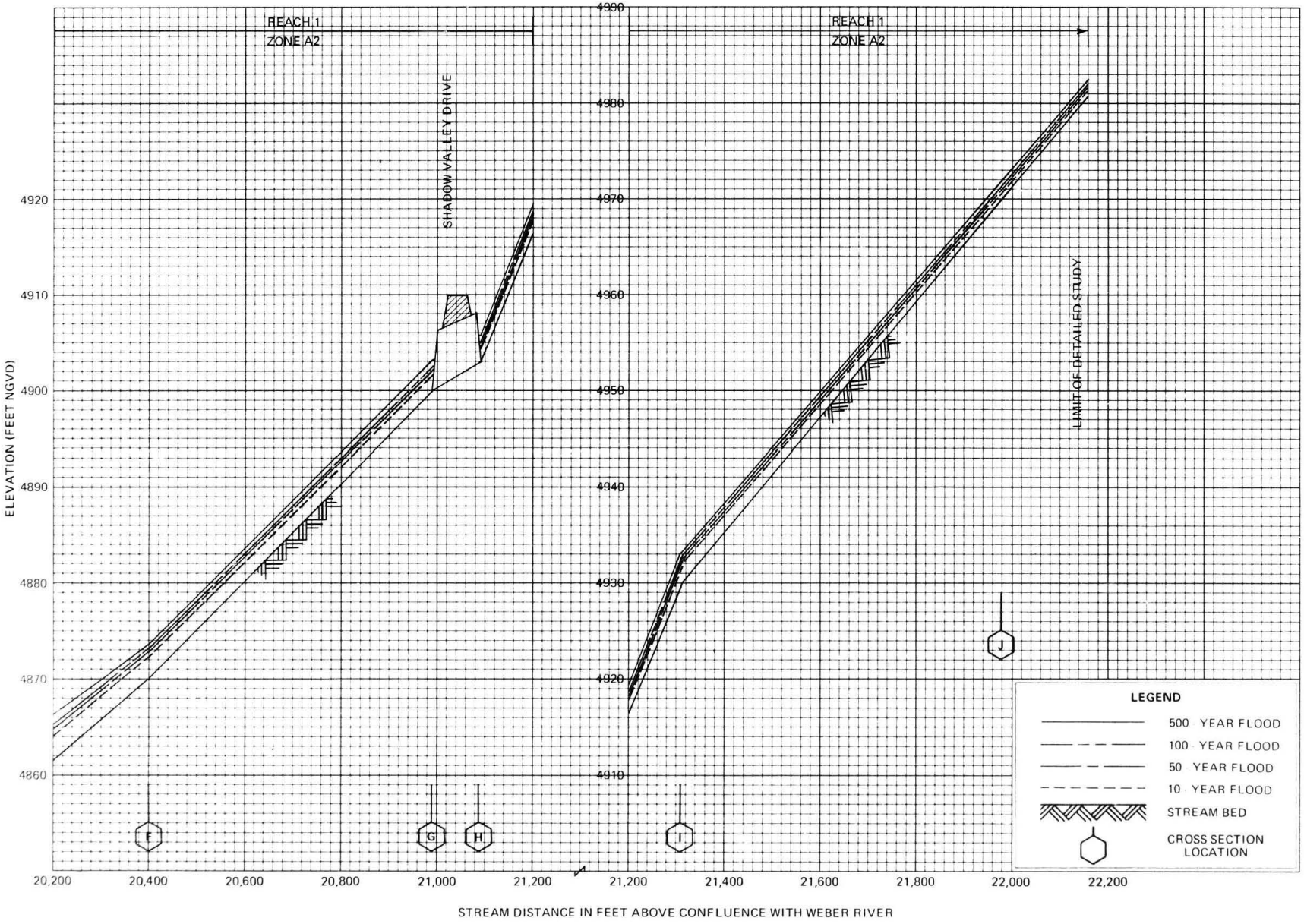

FLOOD PROFILES

BURCH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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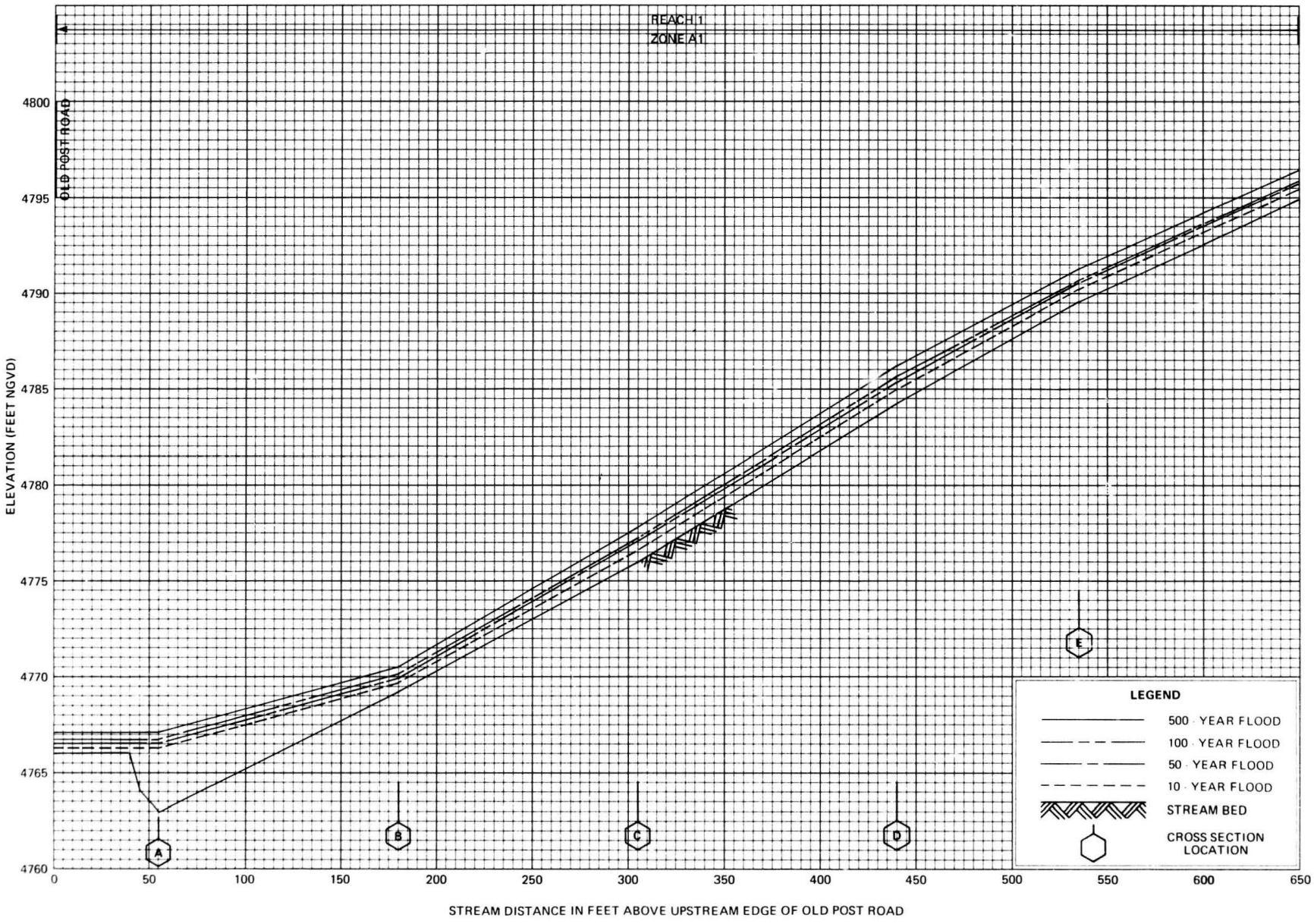

FLOOD PROFILES

BEUS CREEK

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CITY OF OGDEN, UT
(WEBER CO.)

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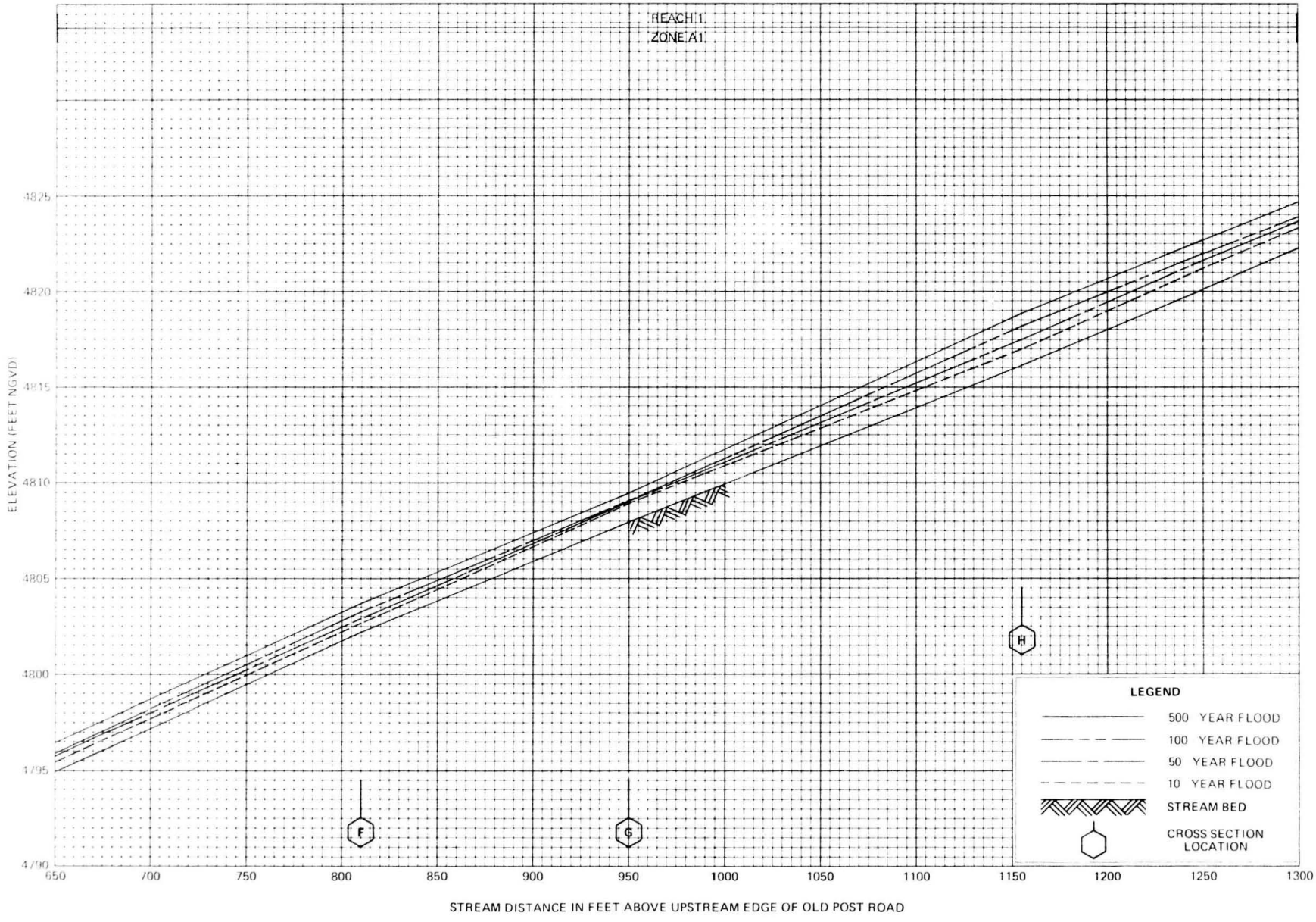

FLOOD PROFILES

BEUS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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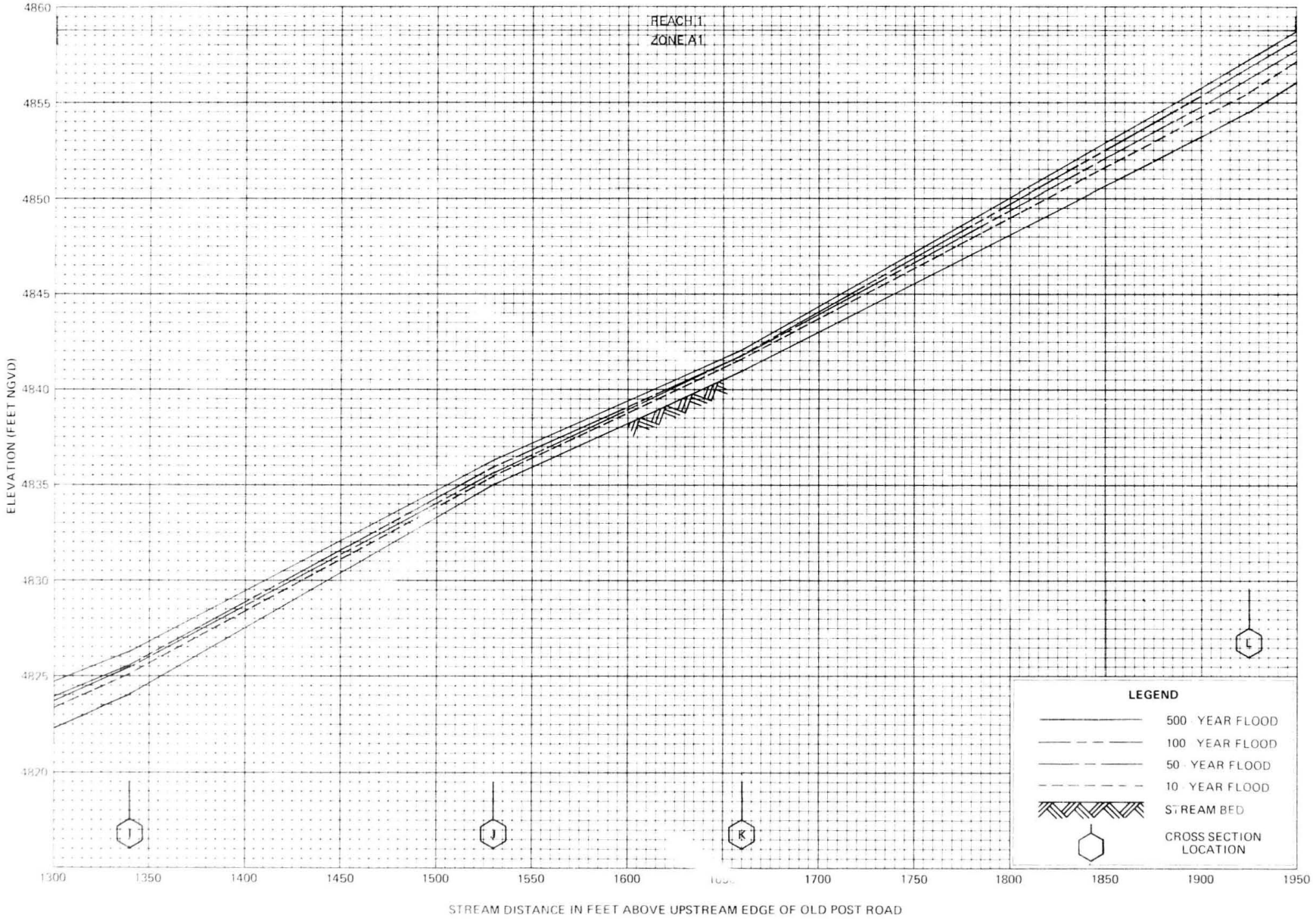

FLOOD PROFILES

BEUS CREEK

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(WEBER CO.)

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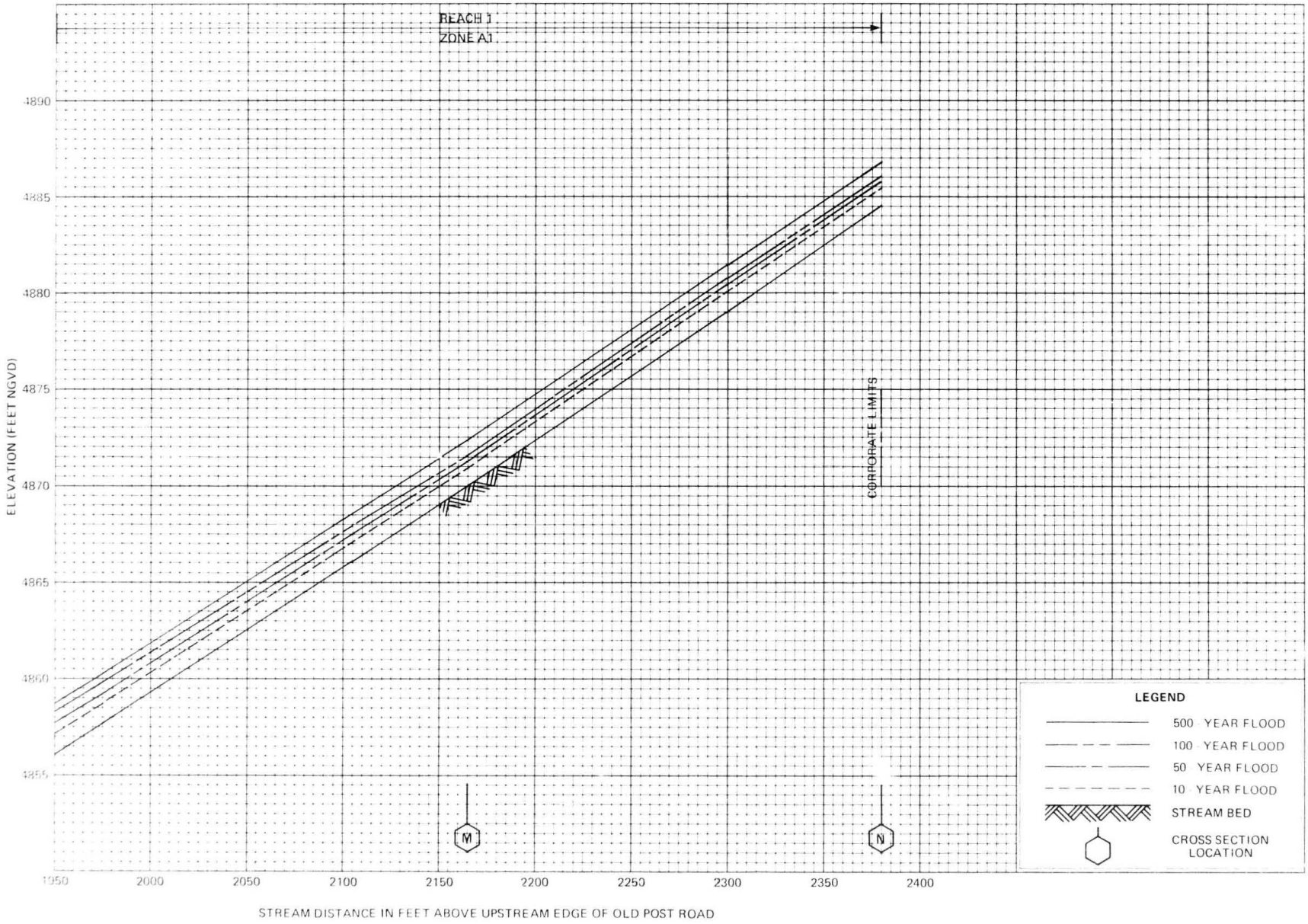

FLOOD PROFILES

BEUS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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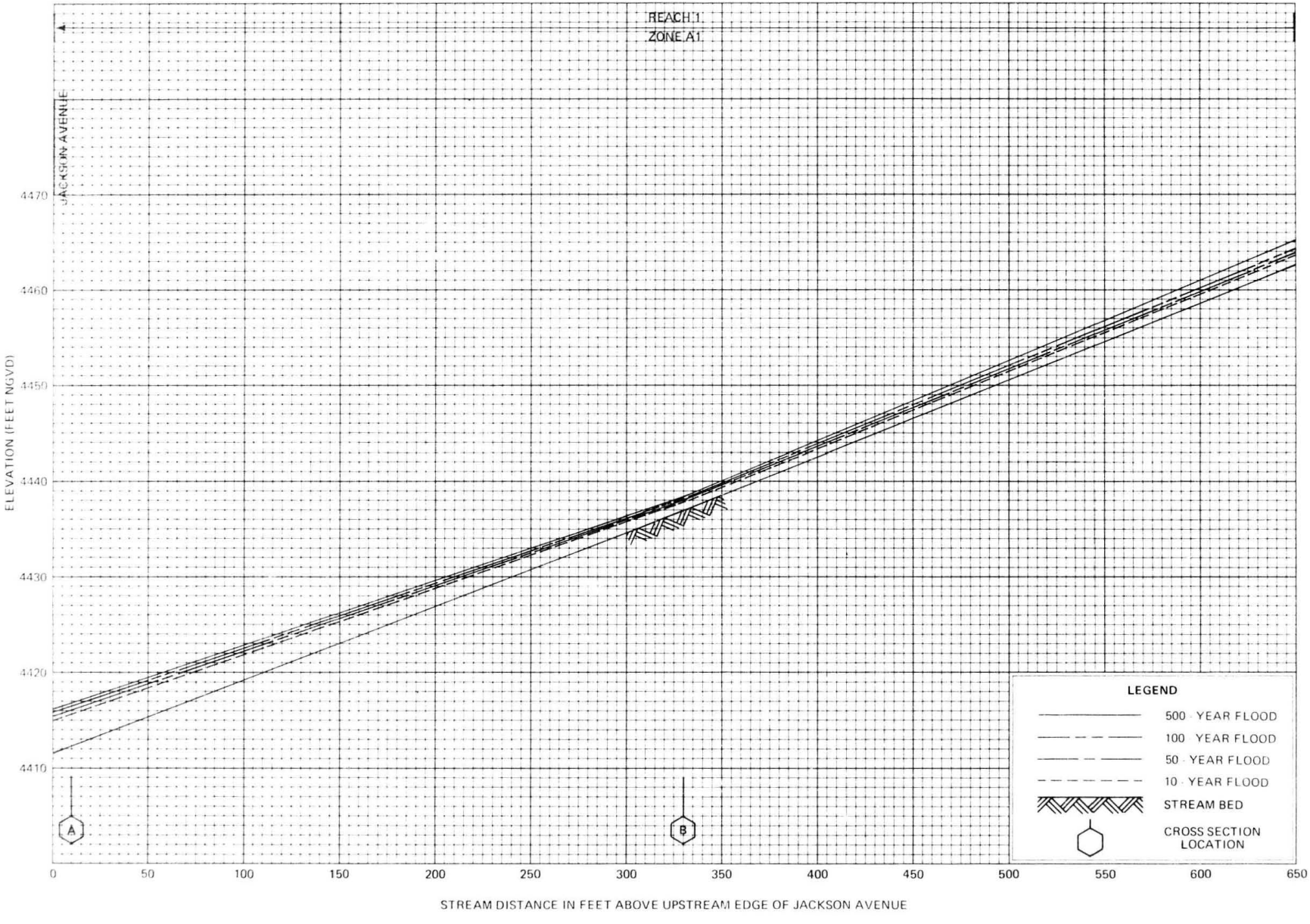

FLOOD PROFILES

JUMPOFF GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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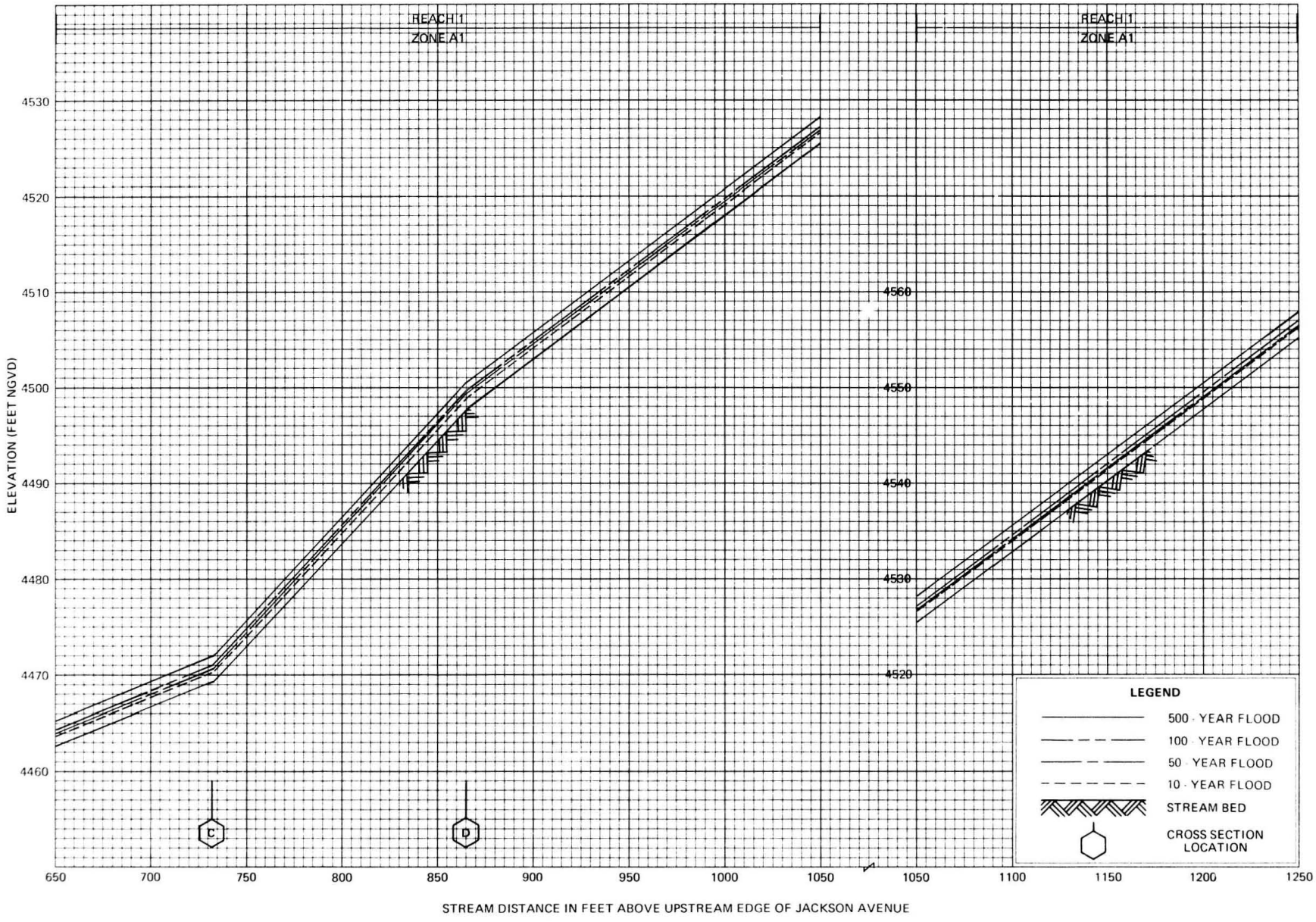

FLOOD PROFILES

JUMPOFF GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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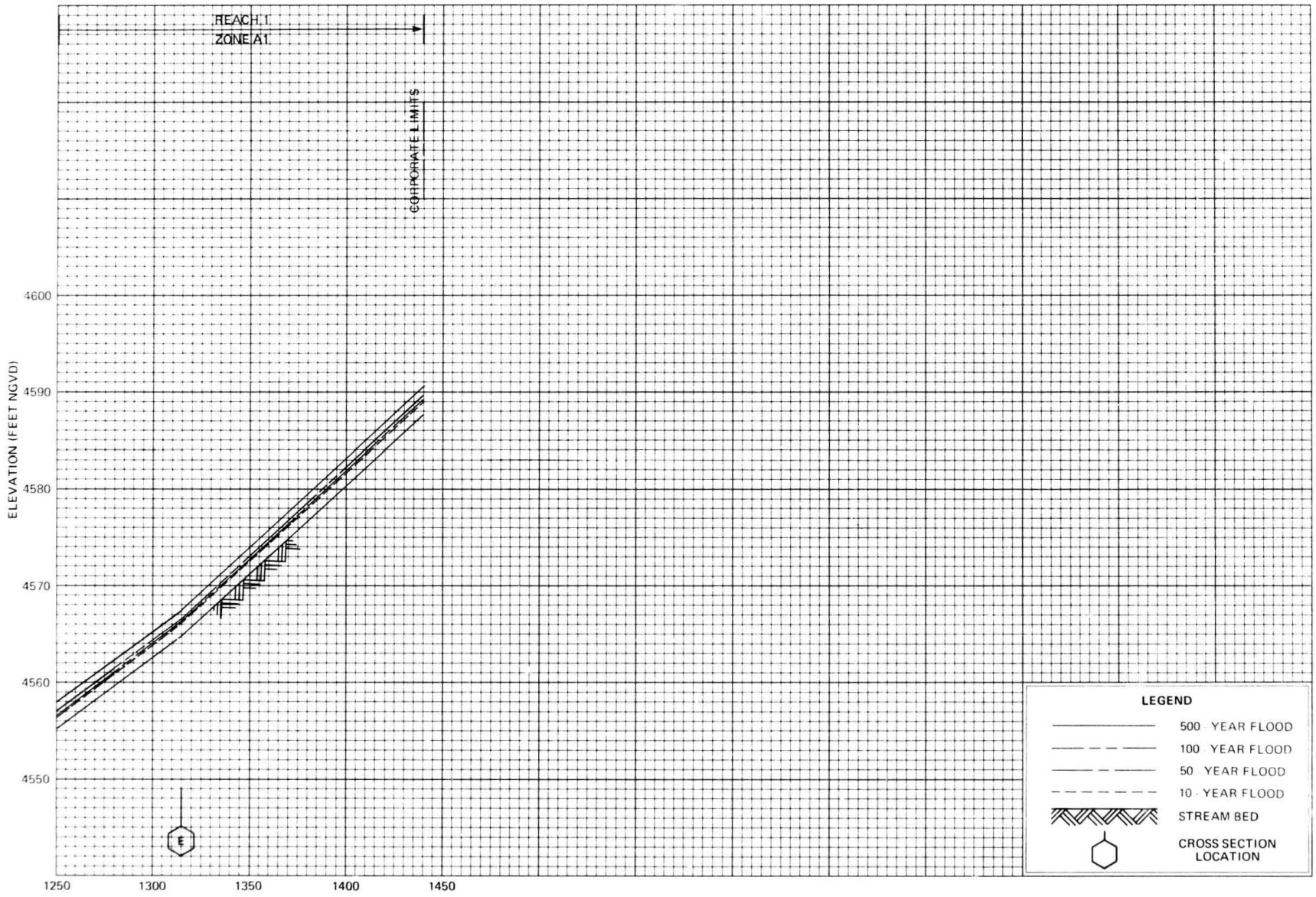

FLOOD PROFILES

JUMPOFF GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF OGDEN, UT
(WEBER CO.)

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